



# National Transportation Safety Board

## **The NTSB Mission to Enhance Transportation Safety: Investigations, Recommendations, and Advocacy**

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Board Member

Salt Lake City Community College  
February 27, 2014

# Federal Agencies: Transportation

NTSB

FMCSA

FRA

NHTSA

PHMSA

DOT

MARAD

FTA

FHWA

FAA



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- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



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All Modes



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# PG&E/San Bruno Gas Pipeline Explosion

- 8 fatalities
- 10 serious injuries
- 48 minor injuries



- 108 homes affected
  - 38 destroyed
  - 17 sev - mod damage
  - 53 minor damage



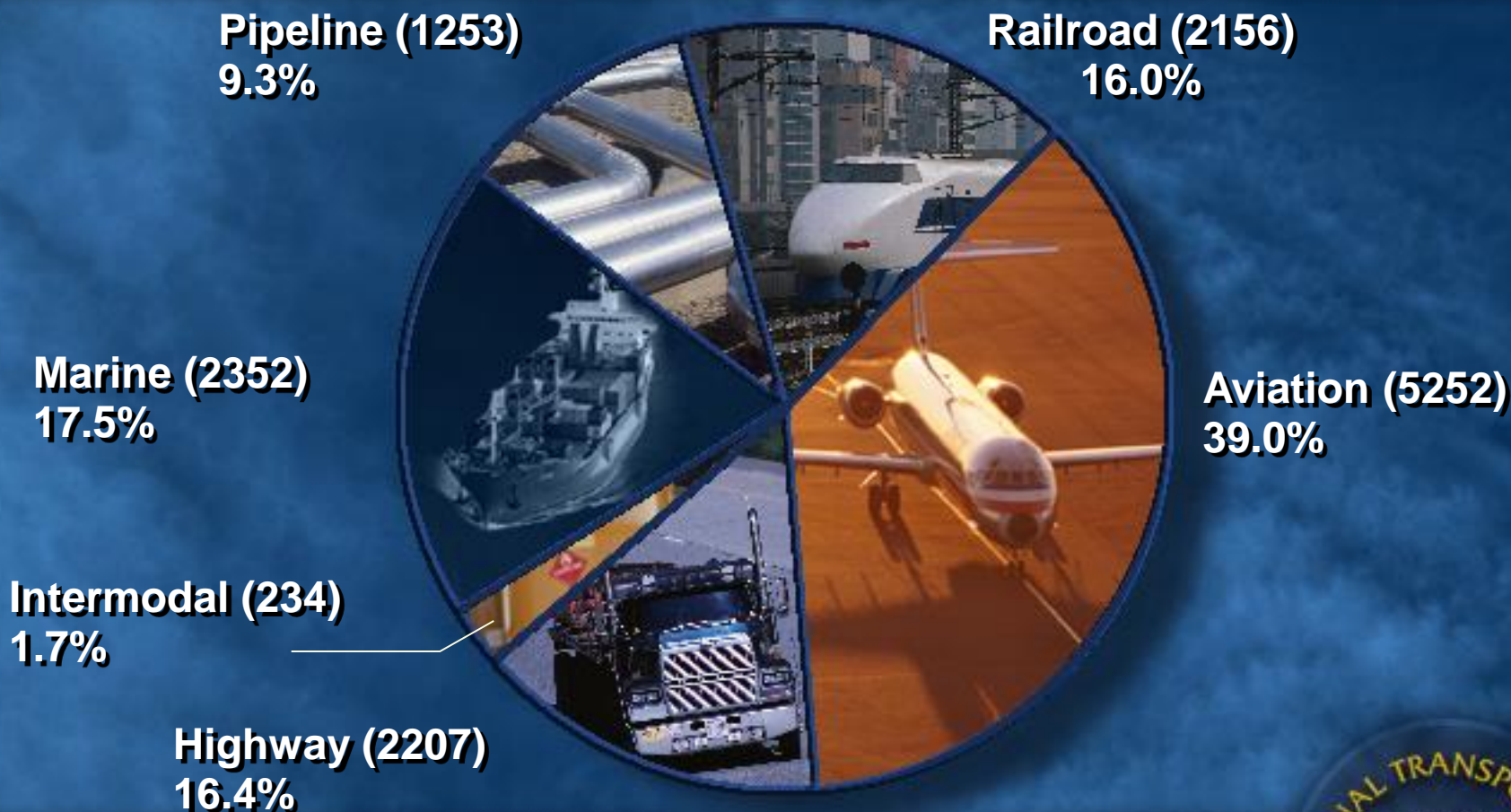
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# Independent Federal Agency: Created in 1967

- ~ 132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate

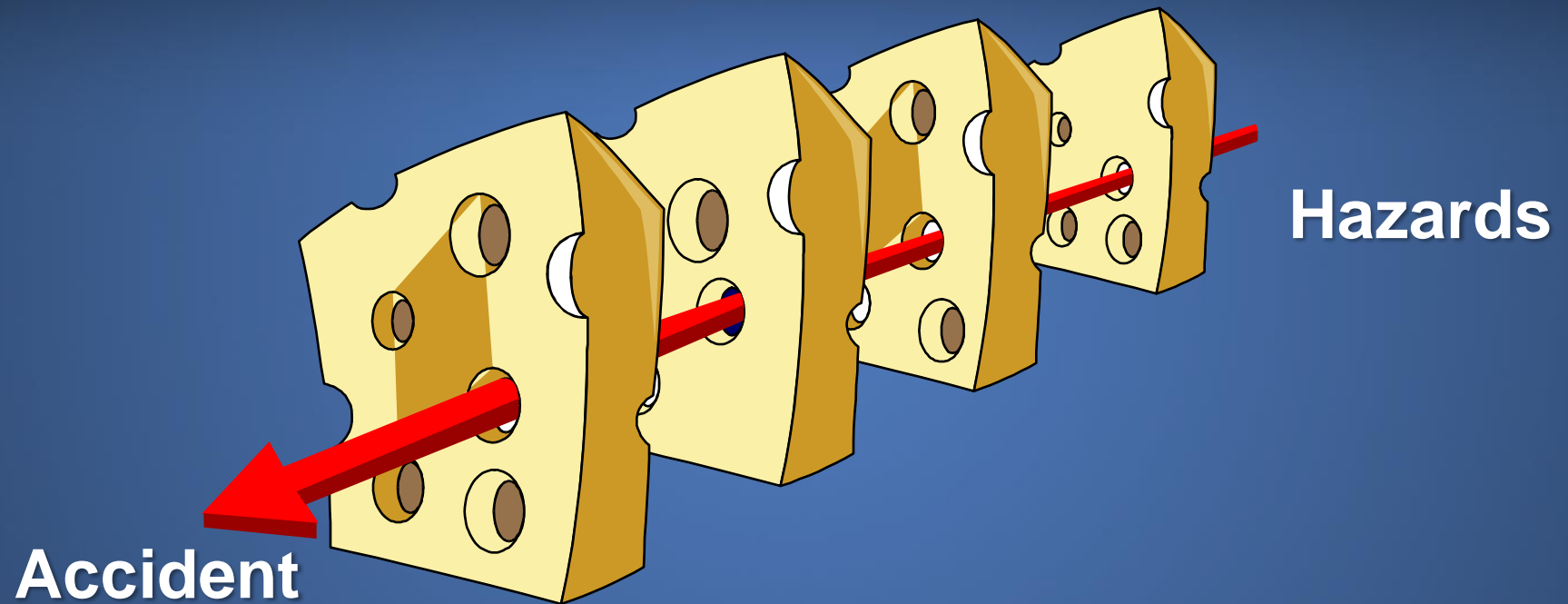


# 13,454 Safety Recommendations issued since 1967





# “Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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# Asiana 214 (July 6, 2013)

## San Francisco, CA (SFO)



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# NTSB Go Team: 24/7/365

- Individual investigator
- Regional/limited team
- Major launch/Board Member





# Key On-scene Events



## Organizational Meeting

- Designate parties and party coordinators
- Establish and organize groups

## Progress Meetings

- Summarize findings
- Info for briefings

## Family Briefings

## Press Briefings



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# NTSB Investigative Process



On-scene  
Investigation  
Organizational  
Meeting  
Groups and  
Parties  
Progress meetings  
Media Briefings  
Press Releases

		NTRM ID: 004068687 Case Number: 00-03239 Case Name: Texas Accident		No. Investigator ID#	
AIR					
Date 01/14/2010		City Code 14032		Last Time 2010	
Time 16:07				Time Zone EDT	
Flight Information					
Operator Name N20830		Aircraft Manufacturer BOMBARDIER CRJ INC		Model/Serial Number CRJ-440	
Type of Aircraft CRJ-440		Aircraft ID Aircraft#			
Status Summary Status 02		Status 02		Status 02	
Status Summary Status 02		Status Summary Status 02		Status Summary Status 02	
Airline Transport Pilot (ATP)					

# Preliminary Report

Factual  
information



# Public Hearing

## Fact finding

## Depositions

## Witnesses

## Docket



Board Meeting

Docket

Findings

Conclusions

Probable Cause

Safety

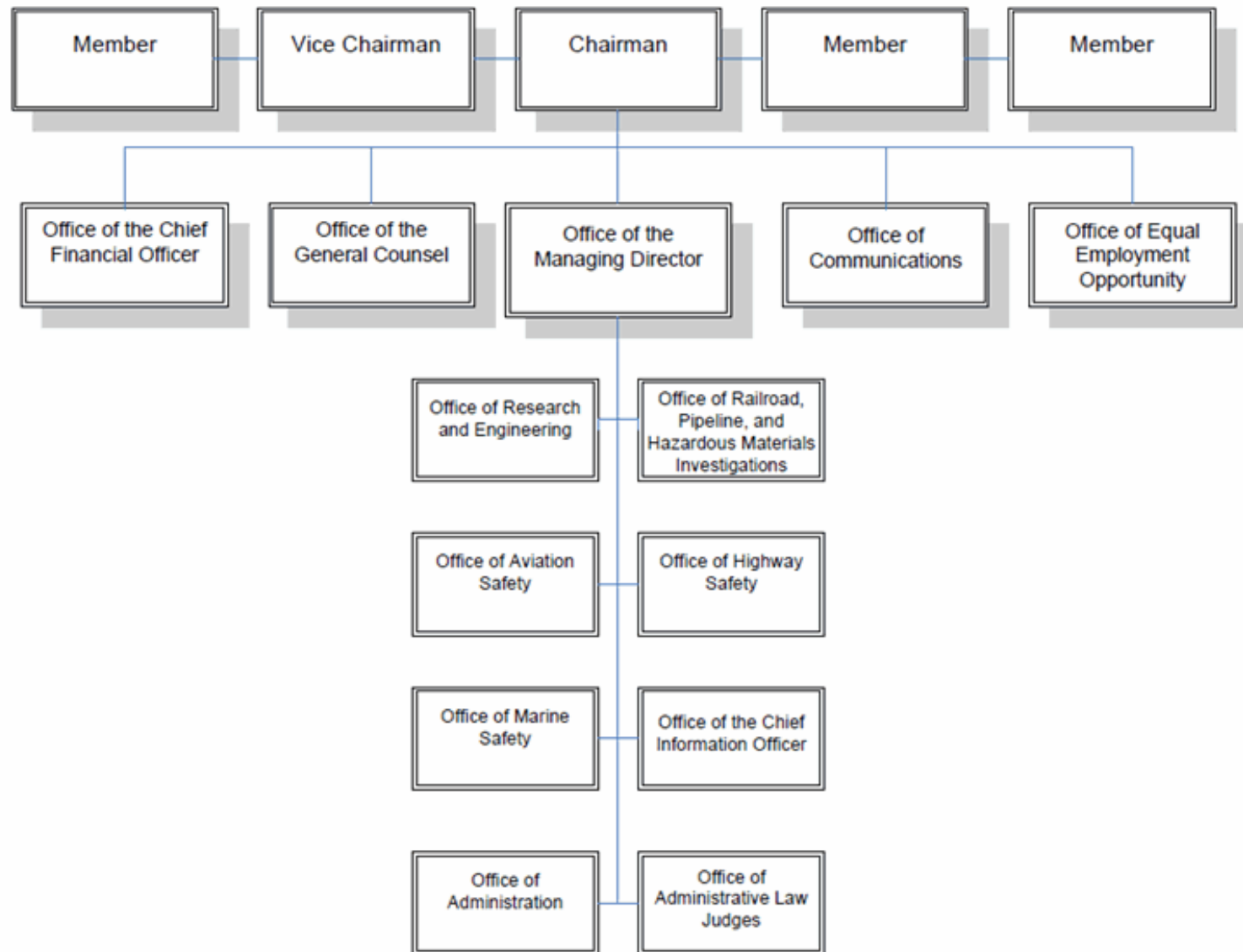
Recommendations



# Final Report

## Government in the Sunshine Act

# NATIONAL TRANSPORTATION SAFETY BOARD



# NTSB: The Board

- Five Members:
  - President nominates
  - Senate confirms



Mark Rosekind  
Member



Chris Hart  
Vice Chairman



Debbie Hersman  
Chairman



Robert Sumwalt  
Member



Earl Weener  
Member



# NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



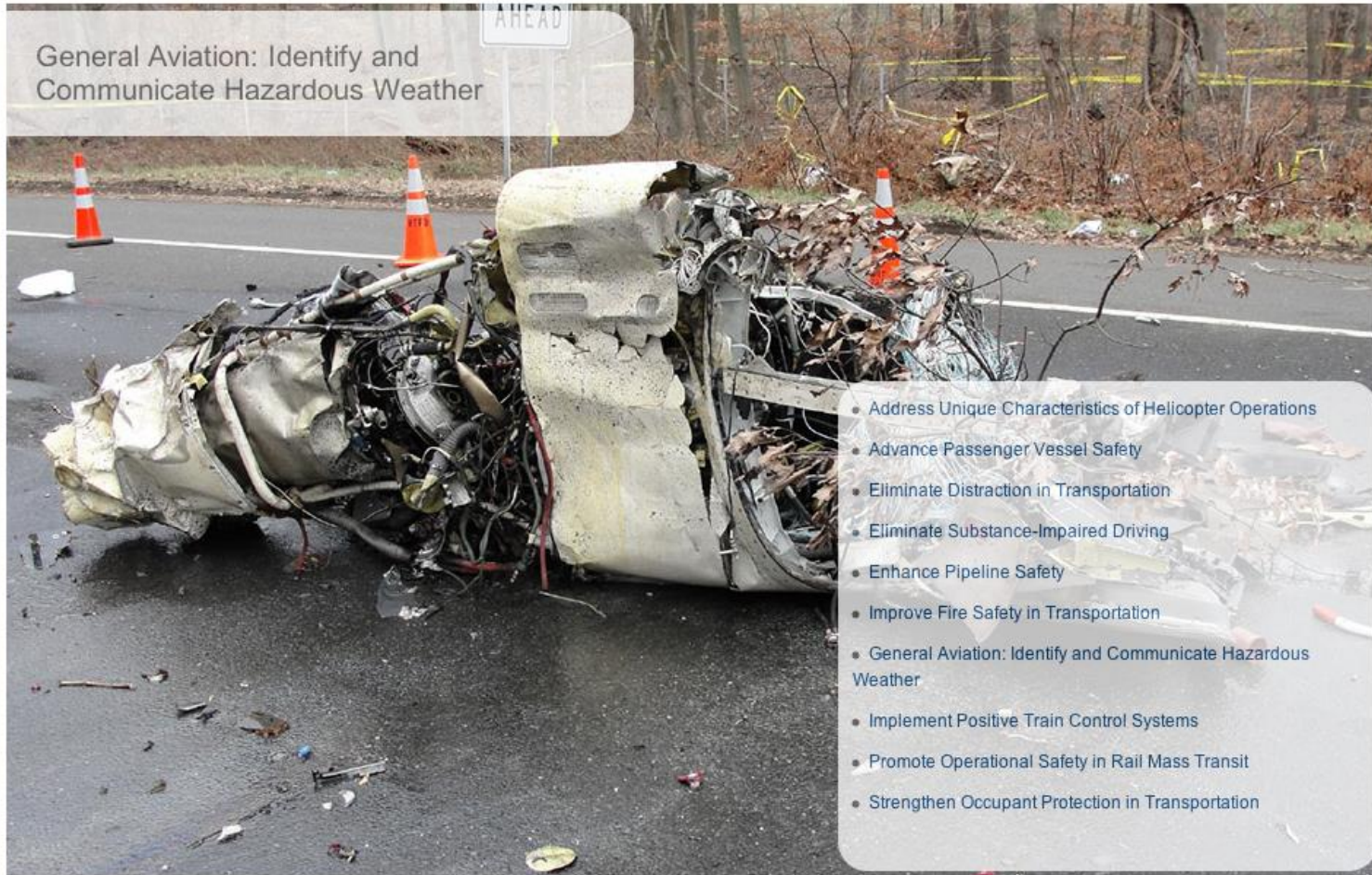
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## MOST WANTED LIST

The Most Wanted List represents the NTSB's advocacy priorities. It is designed to increase awareness of, and support for, the most critical changes needed to reduce transportation accidents and save lives.

### General Aviation: Identify and Communicate Hazardous Weather



- Address Unique Characteristics of Helicopter Operations
- Advance Passenger Vessel Safety
- Eliminate Distraction in Transportation
- Eliminate Substance-Impaired Driving
- Enhance Pipeline Safety
- Improve Fire Safety in Transportation
- General Aviation: Identify and Communicate Hazardous Weather
- Implement Positive Train Control Systems
- Promote Operational Safety in Rail Mass Transit
- Strengthen Occupant Protection in Transportation

# What is General Aviation?



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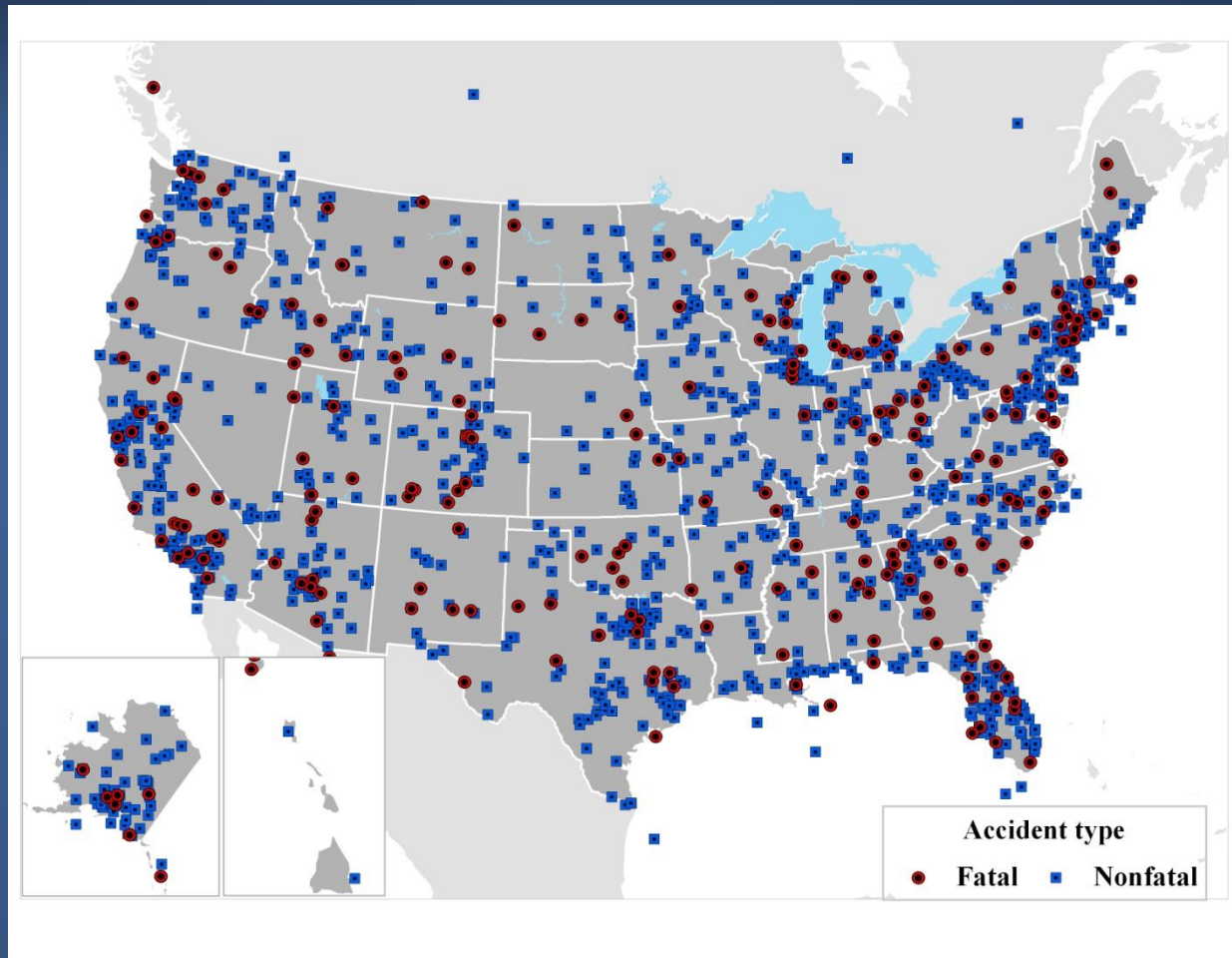


# Pilots, Aircraft, and Flight Activity (Estimates)

- 55,000 new student pilot certificates issued (2011)
- 97,000 active flight instructors
- 617,000 active pilots
- 215,000 aircraft active in GA
  - 155,000 of those are fixed-wing, piston-powered
- 21.7 million hours flown in 2010
  - 10.4 million hours were personal/business flights



# Geographic Distribution of Accidents

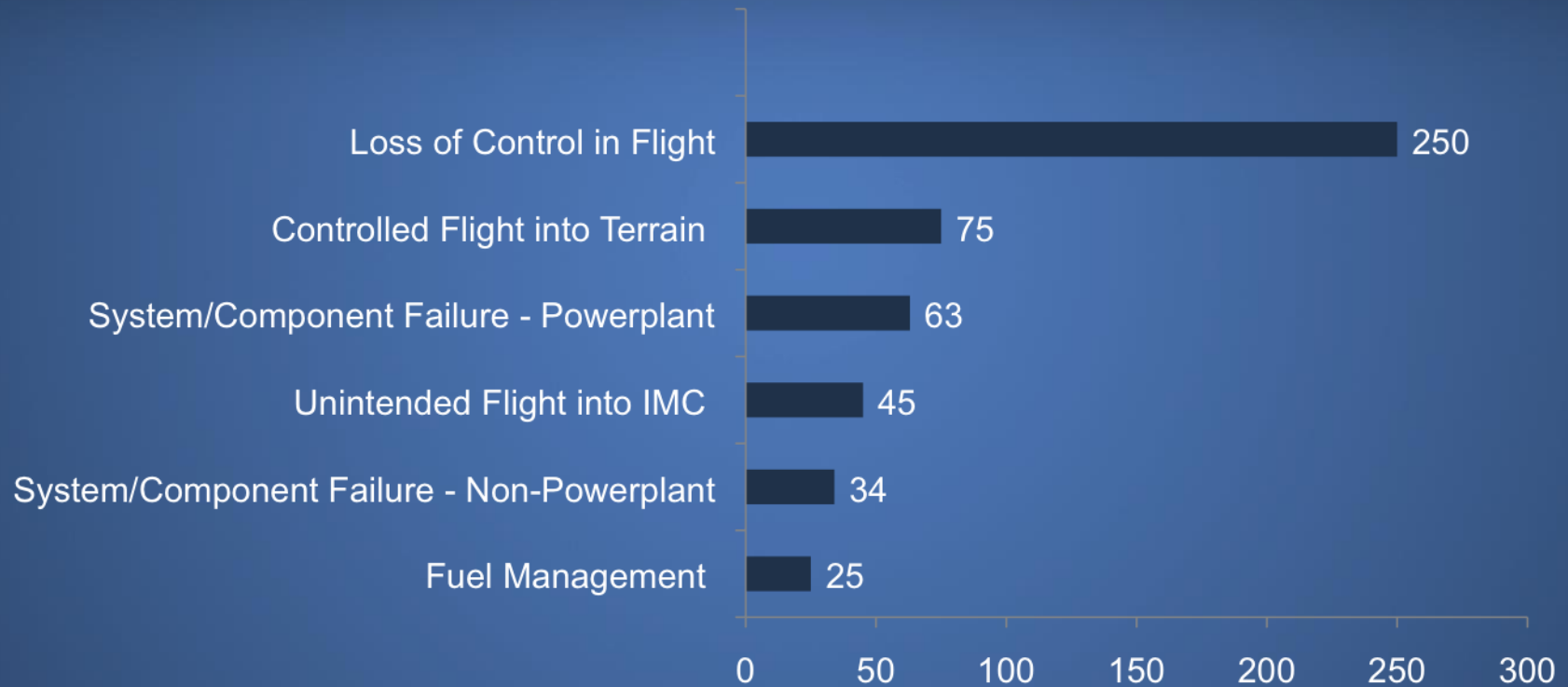


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# Personal Flying Defining Events

## Number of Fatal Accidents





## NTSB SAFETY ALERT

National Transportation Safety Board

### ★ In-Cockpit NEXRAD Mosaic Imagery ★

*Actual Age of NEXRAD Data Can Differ Significantly  
From Age Indicated on Display*

#### The Problem

- Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers.
- A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain new information from each ground site.
- The age indicator associated with the age of the actual data. Instead, the age indicator shows the age of the service provider. Weather service providers can be older than the age indicated on the display.
- Due to latencies inherent in the ground site to the cockpit display, the age of the mosaic-creation process can significantly differ from the time the image is displayed.
- Although such situations are rare, the age of the mosaic-creation process can EXCEED the age indicated on the display.
- Even small time differences can be important for safety of flight, especially in the case of hazardous weather conditions.

<sup>1</sup> Actual maximum age differences can



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### ★ Meteorological Evaluation Towers

*Pilots urged to be vigilant for  
Meteorological Evaluation Towers*

#### The Problem

- Meteorological Evaluation Towers (METs) are used to measure wind speed and direction during the development of wind energy conversion facilities. METs are made from galvanized tubing (or other galvanized structure) with a diameter of 6 to 8 inches and are secured with guy wires that connect at multiple heights on the MET and anchor on the ground.
- Many METs fall just below the 200-foot Federal Aviation Administration (FAA) threshold for obstruction markings. They can also be erected quickly and without notice to the local aviation community, depending upon their location.
- Because of their size and color, pilots have reported difficulty seeing METs from the air. Therefore, METs could interfere with low-flying aircraft operations, including those involving helicopter emergency medical services, law enforcement, animal damage control, fish and wildlife, agriculture, and aerial fire suppression.
- The NTSB has investigated several fatal accidents involving aircraft collisions with METs:
  - On January 10, 2011, a Rockwell International S-2R, N4077X, collided with a MET during an aerial application in Oakley, California.
  - On May 19, 2005, an Air Tractor AT-602, N90172, collided with a MET that was erected 15 days before the accident in Ralls, Texas.
  - On December 15, 2003, an Erickson SH-A Global, N434BW, collided with a MET near Vanaville, Oregon.
- While Wyoming and South Dakota have implemented requirements for METs to improve the safety of low-flying aircraft, not all states have such requirements for METs. (Wyoming maintains an online database of METs and requires all METs to be registered and marked so that they are visible from a distance of 2,000 feet. South Dakota requires that METs be marked.)

# General Aviation (GA) Safety Alerts

March 12, 2013



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# GA Safety Alerts

- Define a GA safety problem
- Provide statistics on the problem
- Provide examples of accidents
- Provide ways to prevent accidents



# GA Safety Alert Topics

- Aerodynamic stalls at low altitude
- Reduced-visual references
- Aircraft mechanical problems
- Pilots' risk management
- Mechanics' risk management



# GA Safety Alert: “Prevent Aerodynamic Stalls at Low Altitude”







# Stall/Spin After Takeoff Accident

Chris Shaver - IIC



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# Stall in Airport Traffic Pattern

Jennifer Rodi - IIC



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# Aerodynamic Stall During Maneuvers

Craig Hatch - IIC



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# What can pilots do?

- Seek training to fully understand stall phenomenon and AOA concepts
- Remember that a stall can occur at any airspeed, in any attitude, and at any engine power setting



# What can pilots do?

- Remember that maneuvering loads, other factors increase stall speed
- Reduce AOA at first indication of stall – it's the most important immediate response



# What can pilots do?

- Manage distractions when maneuvering at low altitude
- Resist temptation to “show off”
- Understand that stall characteristics can differ substantially between airplanes





# GA Safety Alert Topics

- "Armed" for Safety: Emergency Locator Transmitters (SA-030)
- Engine Power Loss Due to Carburetor Icing (SA-029)
- Proper Use of Fiber or Nylon Self-Locking Nuts (SA-028)
- Check Your Restraints (SA-027)
- All Secure, All Clear (SA-026)
- Avoid Nonoperational Use of Portable Electronic Devices (PEDs) Before and During Flight (SA-025)



# Go! Flight 1002



- early starts, multiple segment days, sleep apnea



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Honorable John K. Lauber:

No Accident  $\neq$   
Safe Operation



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# Owatonna, MN (July 31, 2008)



8 fatalities



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# Owatonna Crew Fatigue Factors

- acute sleep loss (Capt/FO)
- cumulative sleep debt (FO)
- early start time (Capt/FO)
- excessive sleep need (Capt)
- insomnia (FO)
- self-medicate/prescription sleep med (FO)



# Probable Cause/Contributing Factors

“Contributing to the accident were . . .  
(2) fatigue, which likely impaired both  
pilots’ performance; . . .”



# GA Accident: GULF OF MEXICO (February 17, 1994)

THE PILOT FELL ASLEEP WHILE ENROUTE FROM SPRINGFIELD, KY TO CROSSVILLE, TN WHEN HE AWOKE 5 HOURS LATER HE FOUND THAT HE WAS OVER THE GULF OF MEXICO, 210 MILES SOUTH OF PANAMA CITY, FL, AND HAD ONLY 20 MINUTES OF FUEL REMAINING. HE DECLARED MAYDAY ON 121.5 AND WAS ASSISTED BY COAST GUARD AND AIR FORCE AIRCRAFT. THEY DIRECTED HIM TO THE NEAREST AIRPORT, ST. PETERSBURG, FL WHILE ENROUTE TO THE AIRPORT THE ENGINES QUIT DUE TO FUEL EXHAUSTION AND THE AIRCRAFT WAS DITCHED, 70 MILES WEST OF ST. PETERSBURG. HE WAS RESCUED BY A COAST GUARD HELICOPTER.



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# GA Accident: GULF OF MEXICO (February 17, 1994)

- The National Transportation Safety Board determines the probable cause(s) of this accident to be:

THE PILOT'S PHYSIOLOGICAL CONDITION (FAILURE TO REMAIN AWAKE) RESULTING IN EXTENDED FLIGHT OVER WATER FOLLOWED BY FUEL EXHAUSTION, TOTAL LOSS OF ENGINE POWER, AND DITCHING BEFORE RETURNING TO LAND.



# Challenges of a 24/7 Society



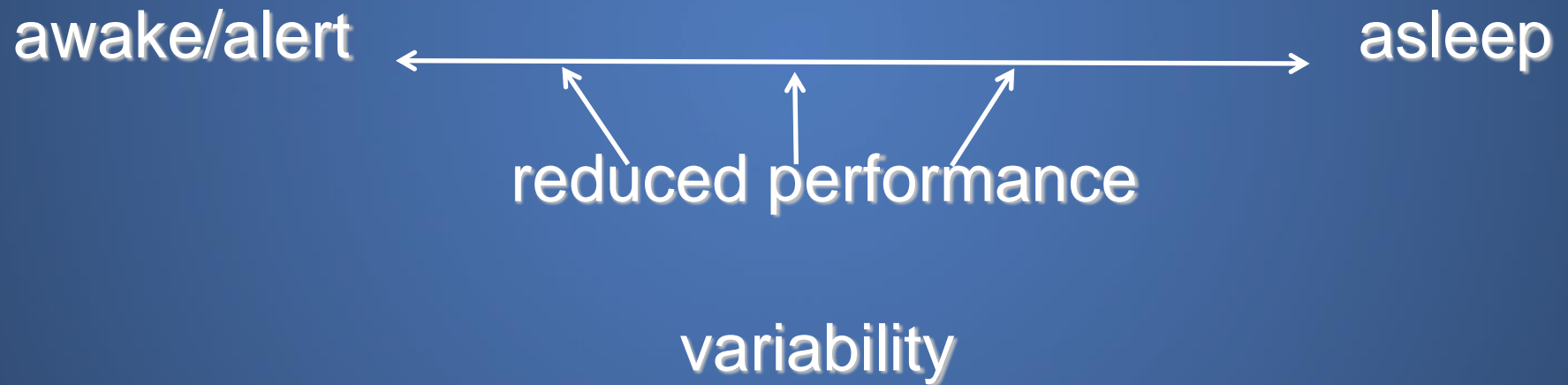
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# Four Fatigue Factors +

- Sleep loss
- Continuous hours of wakefulness
- Circadian/time of day
- Sleep disorders
- Other considerations



# Fatigue Risks





# Fatigue Risks

- degraded 20 – 50%+:

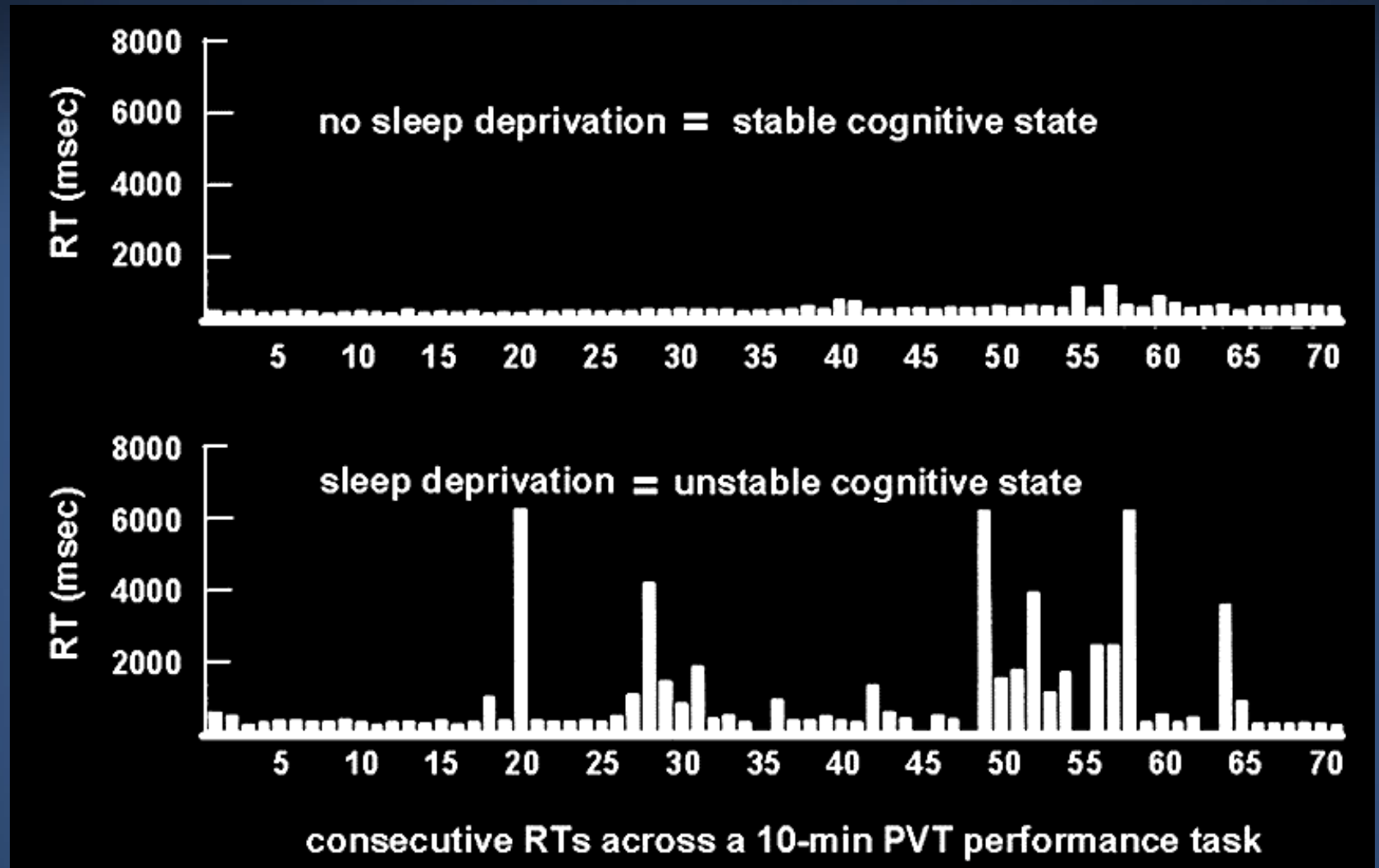
- reaction time
- memory
- communication
- situational awareness
- judgment
- attention
- mood

- increased:

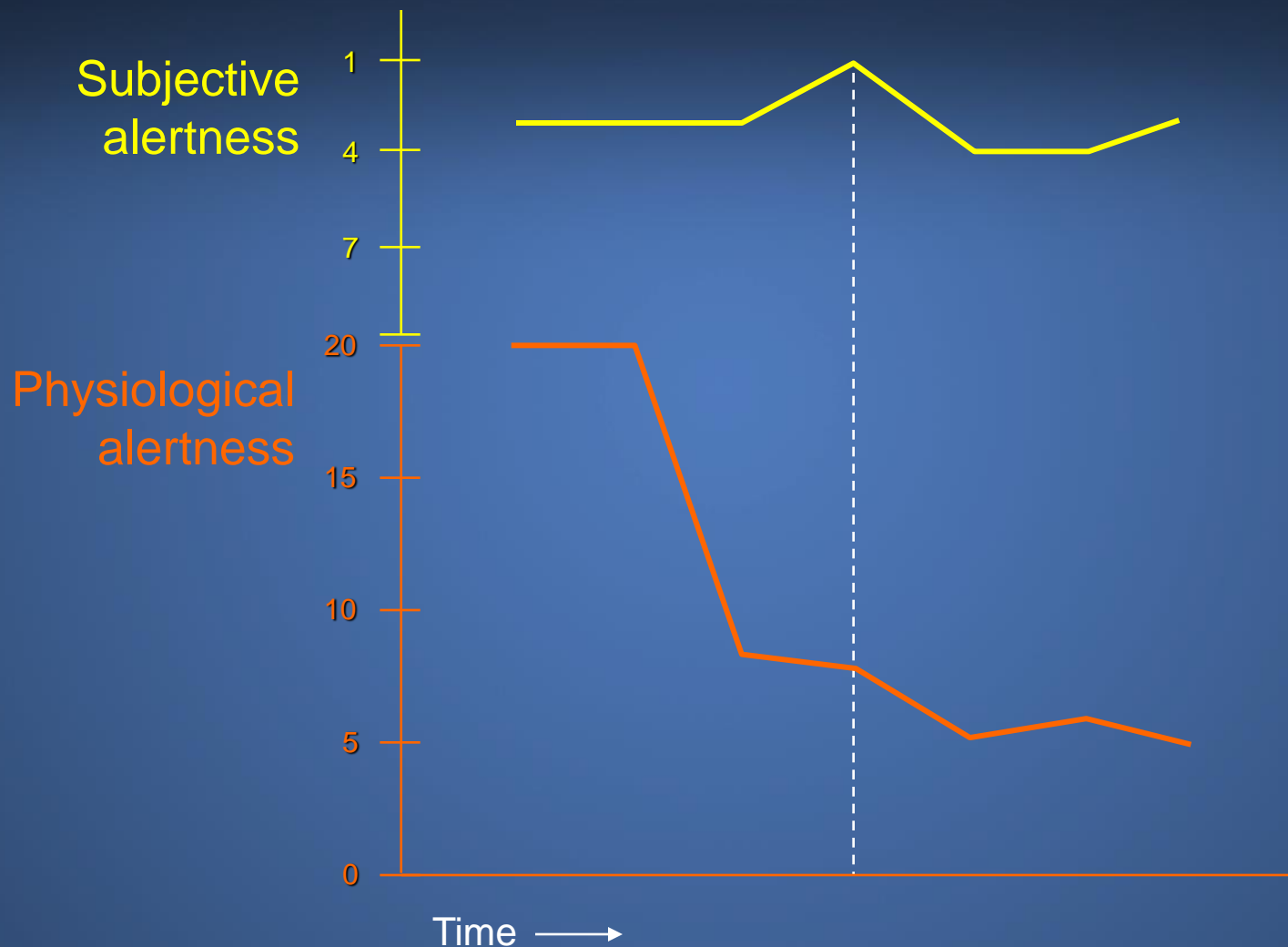
- irritability
- apathy
- attentional lapses
- microsleeps



# Fatigue and Reaction Times



# Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



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[www.nts.gov](http://www.nts.gov)



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